

esent Frankford Link Is Only a Part of Line to Extend to Holmesburg

iners Have Provided for Future Extensions at Both
North and South Ends of "L"—Technical
Description of Work

THE BOTH ARCHES AND PILLARS; SEVERAL FINE SPANS IN LINE

THE Frankford "L" is the first completed operating section of the authorized system of city-owned high-speed transit lines. It has been constructed and equipped in every detail, ready for operation, under the supervision of the Department of City Transit.

Together with the Bustleton surface line it has been leased to the Philadelphia Rapid Transit Company for operation for five years from now.

The completed section of the elevated railway is a two-track structure 1.5 miles in length, constructed over the roadway of Front street, Kensington avenue and Frankford avenue, between Arch street and Bridge street. Connection has been made at Front and Arch streets to the tracks of the Market street subway, but provision has also been made near this point for carrying the tracks south on Front street and connecting to any other city-owned line that may be constructed in the future.

The northern terminus of the line as authorized was Holmesburg, a distance of three miles beyond Bridge street. Financial and other controlling reasons have made it necessary temporarily to stop the road at Bridge street, at which point the car storage and operating yard is located. The structure at this point has been so designed and built that it can be extended northward at any future time without interfering with traffic.

Arch Over Lehigh Avenue
Where the structure crosses wide streets, such as Girard and Allegheny avenues, columns were placed in the center of the cross street. In Lehigh avenue there are double car tracks curving north from Lehigh avenue into Kensington avenue.

This and the height of the structure at this point made it undesirable to place columns in the street, and the steel arches of 112 feet six inches span were designated to carry the structure. The arches were placed over the sidewalks of Kensington avenue near the curb line with abutment piers of concrete carried down to rock. The tracks were spread at this point to bring the loads out adjacent to the arch ribs and to the columns which support the span over the Richmond branch of the Reading Railway, which adjoins the arch on the north.

Where the structure crosses the tracks of the Richmond branch of the Philadelphia and Reading Railway north of Lehigh avenue, and of the connecting railway of the Pennsylvania Railroad at Pacific street, spans of 196 feet and 143 feet, respectively, were required.

Through-trusses of the Pratt type were designed for the Richmond branch crossing, two trusses for each track, with suitable transverse and longitudinal bracing. These trusses have inclined end posts and a curved top chord, and are provided with pin bearings at the points of support. The inside trusses are supported by lattice trusses between columns, with large knee braces attached to each column. The longitudinal stiffness of the structure is secured by the braced towers on either side of the arch. Expansion is taken care of by allowing the columns at the north end of the span to bend. The elevated railway tracks are about forty-three feet above the street at this point.

At the connecting railway crossing two pony trusses of the Pratt type, with inclined end posts and parallel chords, carry the structure. Bethlehem spans twenty-foot metal deep trusses between two trusses to carry the track load. Knee braces support the top chord at each floor beam and the ends of the span rest on pin bearings and roller bearings at the ends of the trusses for expansion. The structure at this point is about forty-six feet from street to the rail, and in order to have adequate support for the towers were placed at either end of the span.

The engineers were governed in their preliminary work by the following fundamental principles: First, that the structure must be of the most economic type; second, that it should represent the latest developments and improvements in the art of elevated way construction; and third, that it should be of a type that will be able and require the lowest expenditure for maintenance.

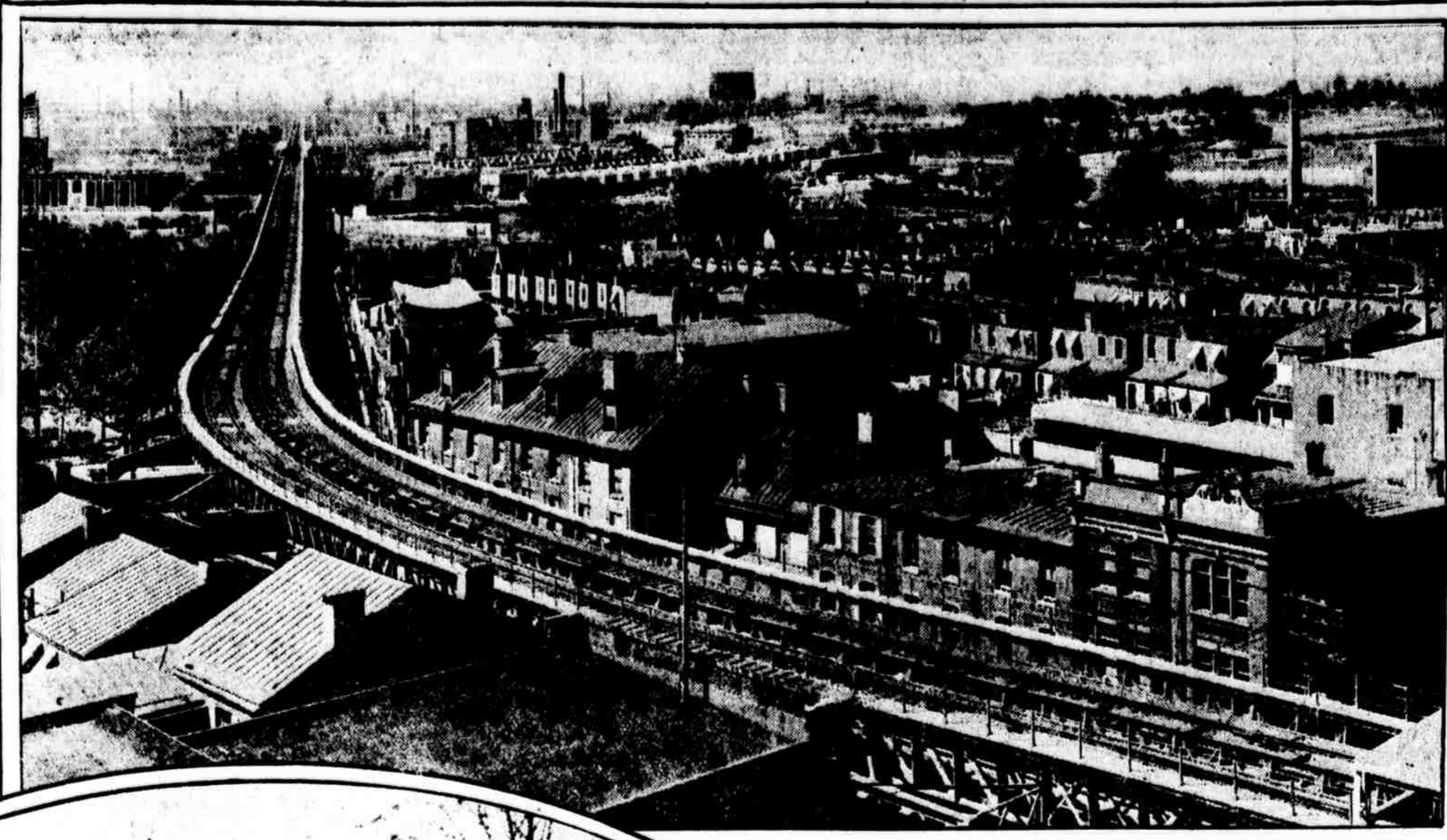
Useful investigations were made to determine the most economic sections of spans before proceeding with the design of a steel structure with columns on the sidewalk, supporting a heavy girder, which, in turn, carries the longitudinal trusses. These, in turn, support beams which carry the concrete deck.

The column bases of the usual rectangular base of eight to ten square feet, and the minimum distance from the sole plate to the edge of the concrete was fixed at six inches. The columns were designed for a bearing pressure of 10,000 pounds per square foot, and the concrete was fixed at six inches. The columns were designed for a bearing pressure of 10,000 pounds per square foot, and the concrete was fixed at six inches. The columns were designed for a bearing pressure of 10,000 pounds per square foot, and the concrete was fixed at six inches.

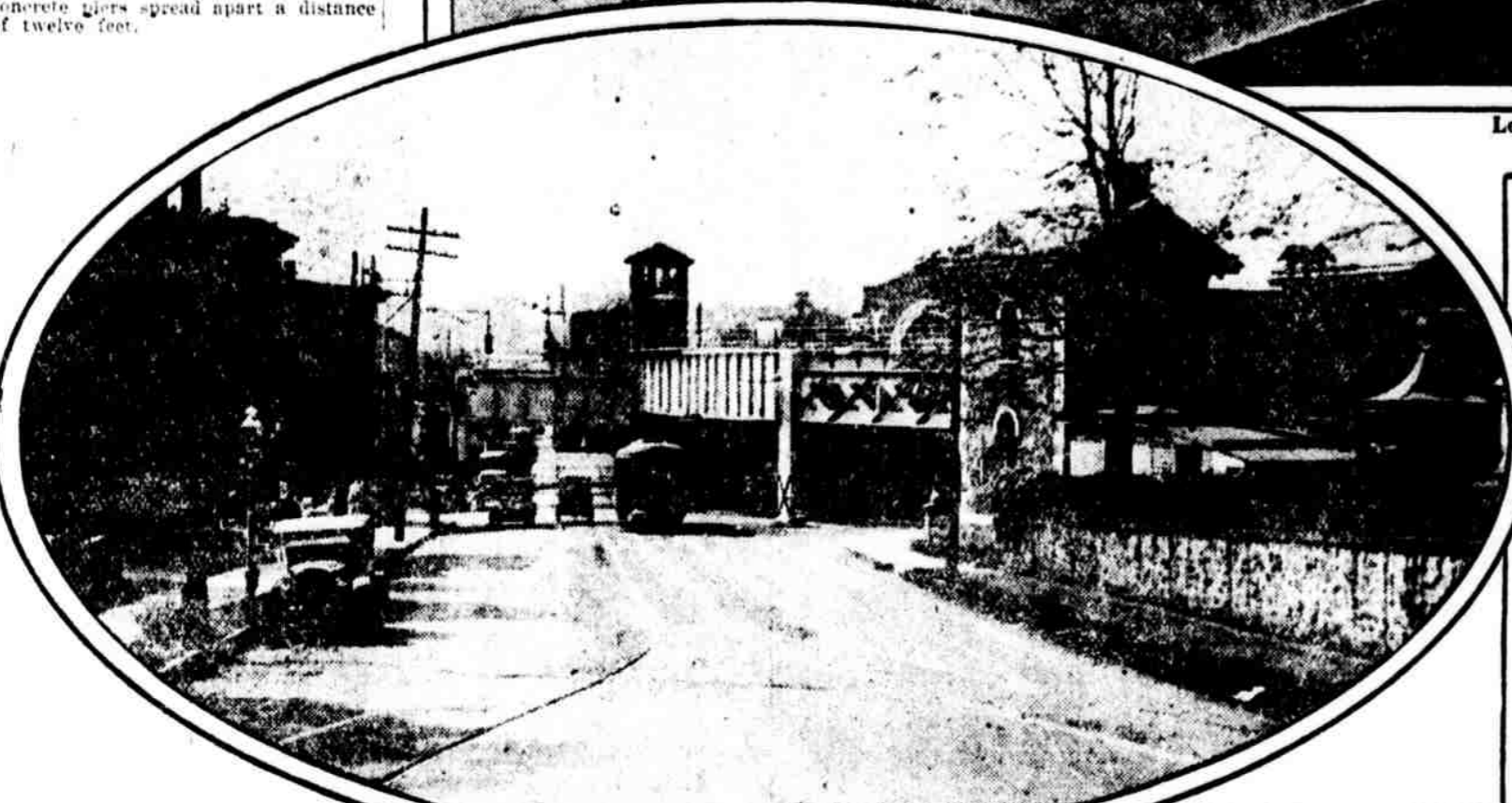
Two Types of Structure
The columns are generally formed with a square or octagonal section. Plates added where loads to be carried required larger sections. The bases in all cases are formed by gusset plates attached to the column and stiffened with angles. Four 1 1/2-inch diameter bolts were built in each pier to anchor the column to the concrete. The concrete was poured in place above the top of the finished pier, and after the structure was leveled and aligned, the space was tamped full of stiff concrete. The entire base was included in concrete, which on the top formed the sidewalk surface, the edge next to the roadway was reinforced with steel-bound edge formed the curb.

It was considered desirable to fill the columns with concrete, both for the sake of appearance and to prevent the accumulation of dirt, and to the benefit from this filling an additional bearing area. The concrete was laid on the ground and filled one side at a time with a special type of column was with a single shaft located.

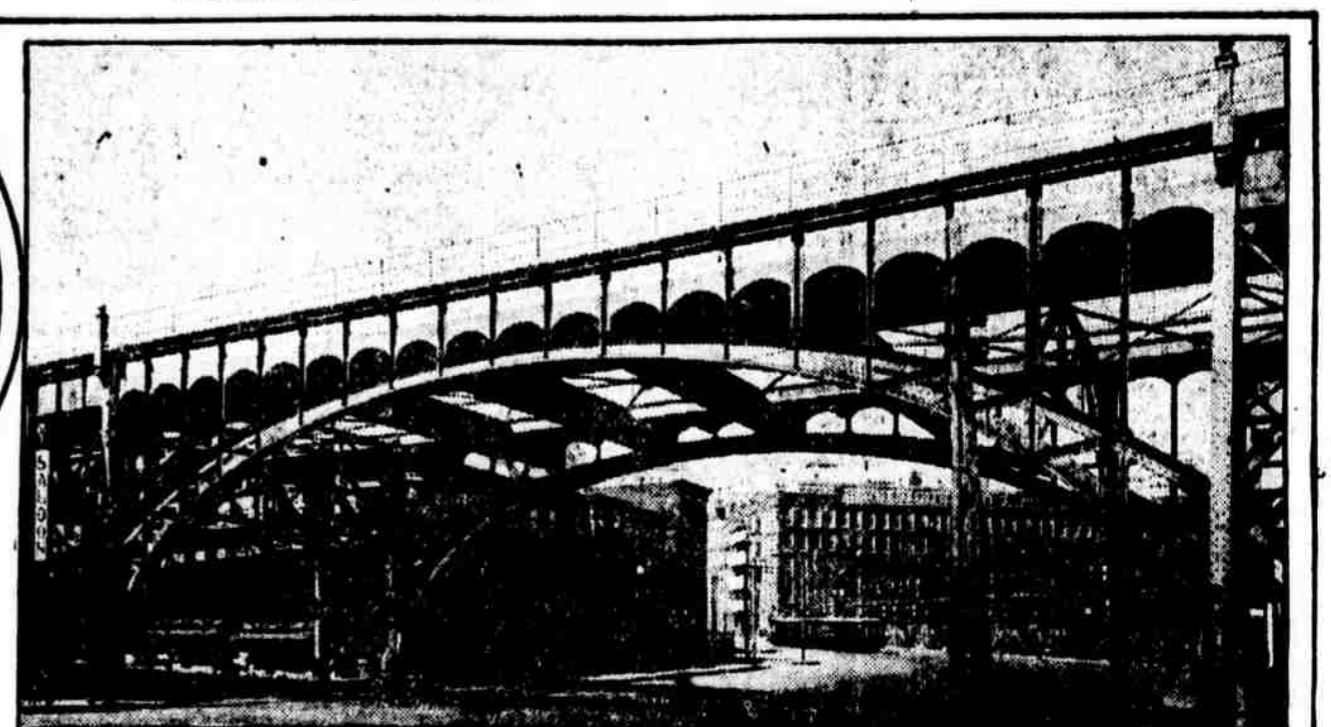
FOUR CAMERA CLICKS ALONG THE FRANKFORD "L"



Looking south from Church street station in Frankford; Torresdale avenue station in distance



Looking south from Brill street; Cedar Hill Cemetery entrance at right



Imposing 112-foot span which bridges Lehigh avenue

New "L" Points Lesson to City

Continued from First Page of This Section
not be bought for \$2000 an acre. The new value of \$2700 an acre added to this \$300 is a pretty substantial proof of the financial value of transportation. To understand the importance of Philadelphia of the opening of this new connection to the northeast, it is necessary to remark that our greatest distance is from northeast to southwest, a distance of about twenty-four miles, whereas one east and west extension is not more than five miles in many places. The piece of land lying to the northeast, consisting of the Forty-fourth and Thirty-fifth Wards, represents more than one-quarter of the total area of the city, the Forty-fourth Ward going down as far as the Forty-fifth and the Thirty-fifth as a line.

These two bodies of land taken together show basic values. A great river extends the whole length of the territory—a river which ultimately will form part of a great canal going from Maine to Florida.

Two great trunk lines of railroads cross this territory leading to all parts of the country, sections which produce raw material and also consume manufactured articles.

It has just to the south of it the developed part of Philadelphia with only 2,000,000 persons. All that is lacking is transportation facilities for individuals and the necessary preliminary work such as opening sewers and streets and purifying water.

The Thirty-fifth Ward alone contains nearly 22,000 acres of land out

New "L" Makes Changes in Other Car Routes

The city has provided 100 cars for the Frankford elevated and five one-man trolleys for the Bustleton line. With the elevated in operation several lines will be abandoned entirely, and the routes of others will be changed. Routes 29 and 27 will be abandoned. The cars which now run on Thirtieth street to Montgomery avenue, to Marshall street, to Berks, to Front, to Kensington avenue, to Frankford avenue, and to Bridge street, on No. 3 Route, will be continued in operation.

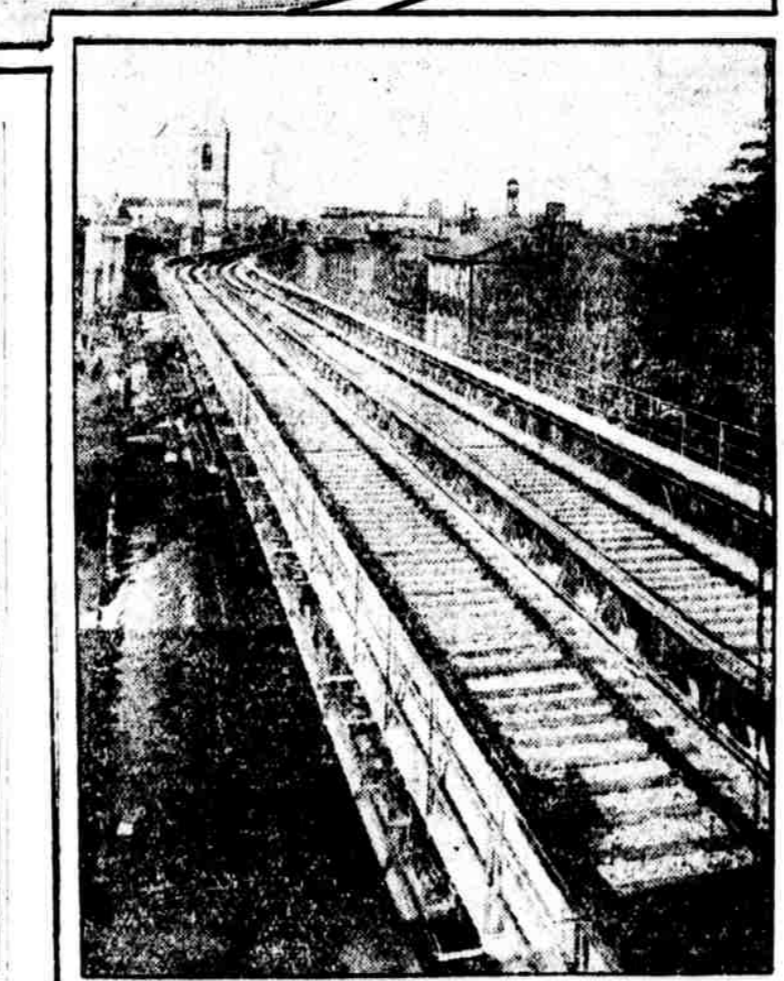
No. 4 Route will start at Hancock street and Lehigh avenue and run to Sixth and Ritten streets.

No. 5 will run between Womrath street, Frankford, and Third and Ritten streets.

Route 58 will be unchanged. The new Bustleton line is given the number 59. Cars on Route 73 will run from Bridge street to Richmond street and Allegheny avenue. Route 75 will not be disturbed.

of the total area of the city of \$2,000. Its population is only 14,267 in contrast with the First Ward in the center of the city with only 448 acres for homes for 42,835 persons.

Practically you could put the whole population of Philadelphia into one-half of the Thirty-fifth Ward, leaving



Looking north from the Church street station platform

the other forty-seven and a half wards without a soul, and yet it would not be more densely populated than the First Ward today.

Let us look at it now from a financial point of view. There are three rates of taxation, a full city rate where the property has all of the city facilities,

acres of land in the Thirty-fifth Ward. All that the northeast has needed to bring it into development has been transportation. This I have been preaching for twenty years and the truth of my prophecy is shown in what has taken place since the operation of the road has been assured. Many properties that were offered for \$300 an acre are selling now for between \$2000 and \$7000.

This great asset of the city has remained undeveloped because it lacked a link with the city's center. That is now provided and with the new links to be constructed, I believe that Philadelphia is entering upon a period in which it will recognize the fact that it can derive revenue within the city limits. This taxation question effects Philadelphia more than any other American city. Because of the industries here we have three times the number of taxpayers that New York has, although New York has three times the population.

Kensington and Frankford lying south of this great district will both benefit by the opening of this road because anything that develops the hinterland will benefit every merchant in that section.

Moreover by creating an additional residential section we will bring the best type of workers within a short distance of the famous textile mills.

The opening therefore of this great artery in the northeast is in my opinion one of the most wonderful events in our history.

John Wanamaker's building stands on four and one-half acres of land and pays in taxes to the city more than twice the taxes paid by the whole 21,835

Estimates of Costs of Two New Lines

Following is the official estimate of the costs of the Frankford elevated and the Bustleton surface lines:

| Actual investment as of October 1, 1922: | Frankford Elevated | Bustleton Surface |
|--|--------------------|-------------------|
| Loan funds: | | |
| Construction & equipment | \$10,678,210.00 | \$469,100.01 |
| Real estate | \$29,745.38 | 282.83 |
| Engineering & administrative | \$87,885.73 | 3,150.10 |
| General appropriations: | | |
| Engineering & administrative | \$334,540.75 | \$21,427.50 |
| Interest | \$2,300.00 | 2,000.00 |
| Street | 1,570,208.44 | 60,000.00 |
| Total | \$13,358,210.80 | \$502,900.41 |
| Estimated additional investment on completion: | | |
| Loan funds: | | |
| Construction & equipment | \$1,000,000.00 | \$100,000.00 |
| Real estate | 170,000.00 | |
| Engineering & administrative | 35,000.00 | |
| General appropriations: | | |
| Engineering & administrative | \$10,000.00 | \$500.00 |
| Interest | 40,000.00 | 2,000.00 |
| Total | \$2,155,000.00 | \$102,500.00 |
| Grand total | \$15,513,210.80 | \$605,400.41 |
| Real estate includes total money spent for land at Front and Arch streets. | | |

a suburban rate of two-thirds where they have only some of the facilities, and then a farm rate which covers most of the section in the Thirty-fifth Ward with only one-half of the city tax rate.

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WAR AND LEASE DELAYED THE 'L'

Three Years Would Be Enough Now to Duplicate Entire Line to Frankford

SOME IMPORTANT DATES

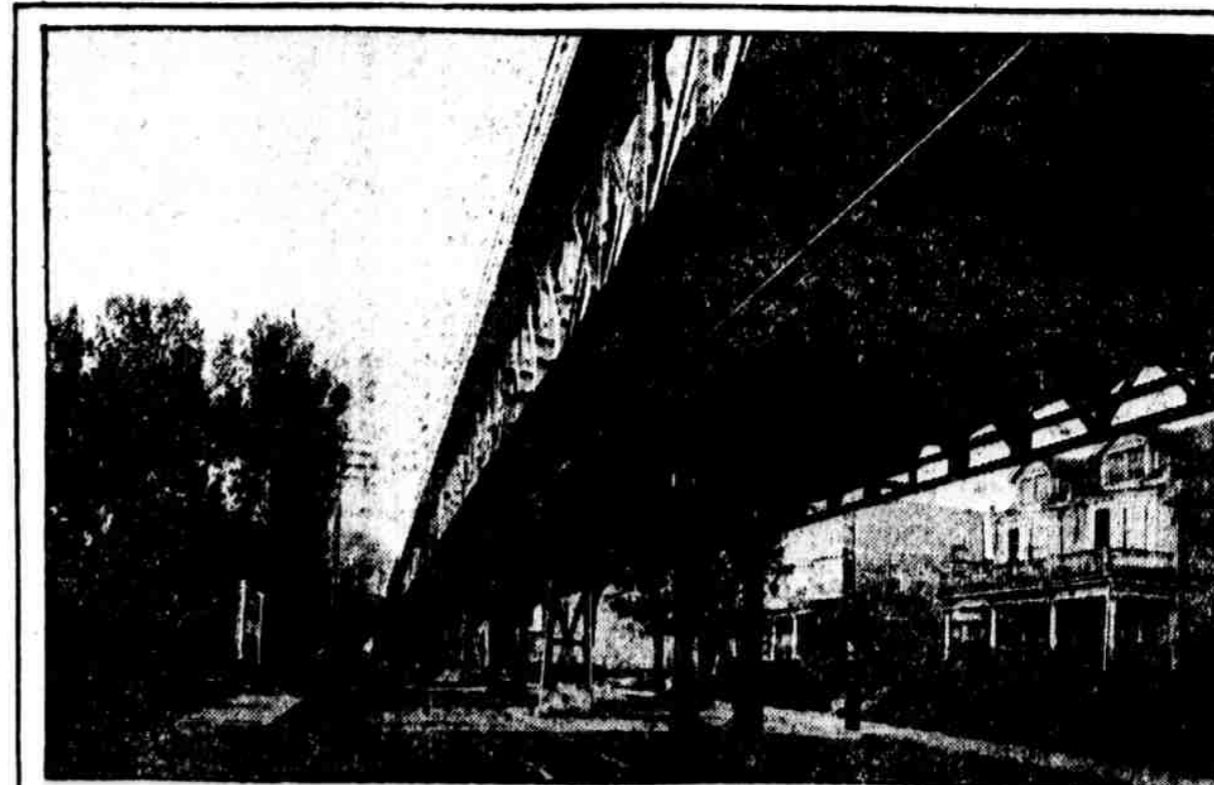
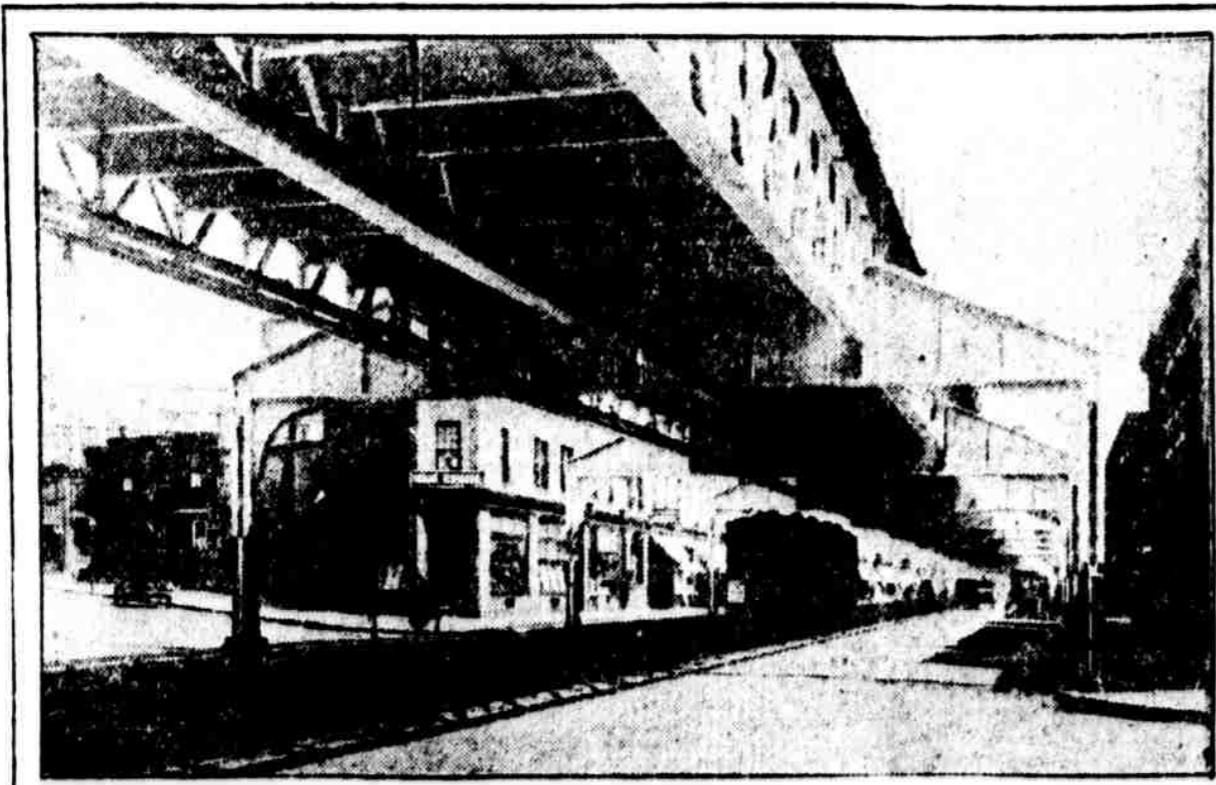
From the experience gained in the construction and equipment of the Frankford "L," more than six miles in length, the Transit Department now believes that an elevated structure of this type might be constructed and fully equipped, ready for operation, in the time originally estimated, which was about three years.

The construction and equipment of the Frankford elevated have actually consumed over seven years, and this addition of four years to the estimated time can only be charged to two causes. First, the World War, and second, the time required to negotiate an agreement for the operation and equipment of the line.

Certificates of public convenience were issued by the Public Service Commission evidencing the commission's approval of the construction of the Frankford "L" and Bustleton surface line as follows:

- August 14, 1915—Callowhill street to Unity street.
- January 25, 1916—Unity street to Dye street.
- July 23, 1917—Bustleton surface line.
- December 11, 1916—Additional station at Huntingdon street in Kensington avenue.
- April 4, 1917—Dye street, Frankford, to Rhawn street, Holmesburg.
- July 23, 1917—Arch street to Callowhill street.
- September 25, 1917—North Berks

TWO TYPES OF STEEL STRUCTURE USED TO CARRY THE FRANKFORD "L"



Two types of superstructure were found necessary to carry the Frankford "L," because of the varying width of the streets. On the left is shown the arch type, which goes from downtown to Unity street. In this the uprights are at the curb and the traffic uses the center of the street. The right-hand view shows the pillar type of construction, which is employed from Unity street to Bridge street. With this type the pillars are in the center of the street and the traffic uses the side.

New Type Cars on Frankford "L"

Continued from First Page of This Section
carbon steel and the wheels and gears are forced on the axles to their proper position under a hydraulic pressure of from sixty to ninety-five tons.

The truck frames and equalizing bars are made from steel forgings, and the bolster and other members of the frame from pressed steel shapes and steel castings. Helical springs on the equalizing bars absorb the first shock from the wheels pounding over special work or rail joints, and two sets of triple elliptical springs between the truck frame and bolster provide a further shock absorber and insure smooth, easy riding. The car bolster is supported over the center of each truck by a disc shape bearing, running in oil, and side bearings of the roller type keep the car from rocking.

The car wheels when new are thirty-four-inch diameter; constant wear from the brake shoes decreases the diameter; height adjusters are provided on the truck frame so that compensation can be made for this wear and the car floor maintained on an even level. Wheels can be kept in service until they are worn to thirty-one and one-half inches in diameter. Safety straps and hangers are provided to catch any broken parts of the truck and brake rigging and prevent their falling on the track and causing damage.